



# *Sensory and instrumental dynamic methods to investigate perceived quality of Italian Extra Virgin Olive Oils*

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**Professore associato:** Centro Agricoltura Alimenti Ambiente - C3A

**Area CUN:** Scienze chimiche (03)

**Settore scientifico disciplinare:** CHIMICA DEGLI ALIMENTI (CHIM/10)



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Eugenio Aprea – C3A (FEM-UniTn)



SISSG 2022 – Perugia, June 15<sup>th</sup> - 17<sup>th</sup>



*Sensory and instrumental **dynamic methods** to investigate perceived quality of Italian Extra Virgin Olive Oils*



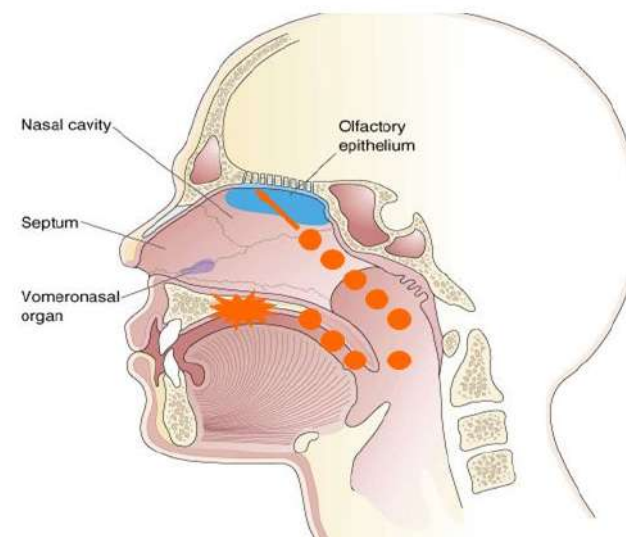
# SENSORY PERCEPTION...

... is a **DYNAMIC** process

Sequences of different phenomena in every single bite/sip:

- Physico-chemical characteristics of the product (composition, structure, size, shape...)
- Biochemical phenomena (i.e. interaction with saliva)
- Physiological phenomena (respiration rate, chewing behaviour, ...)

“Flavour Release” in mouth

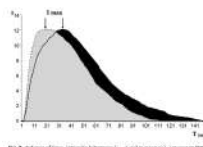


# SENSORY DYNAMIC METHODS

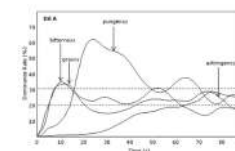
Several sensory dynamic developed to evaluate individual's experience over the course of consumption.

Example of popular temporal methods:

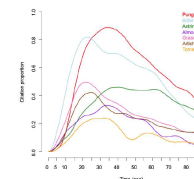
- Time intensity



- Temporal Dominance of Sensation



- Temporal Check-all-that-apply



# Temporal Check-all-that-apply TCATA



(Castura et al., 2016)

used to measure over time the perception of multiple attributes

## Task

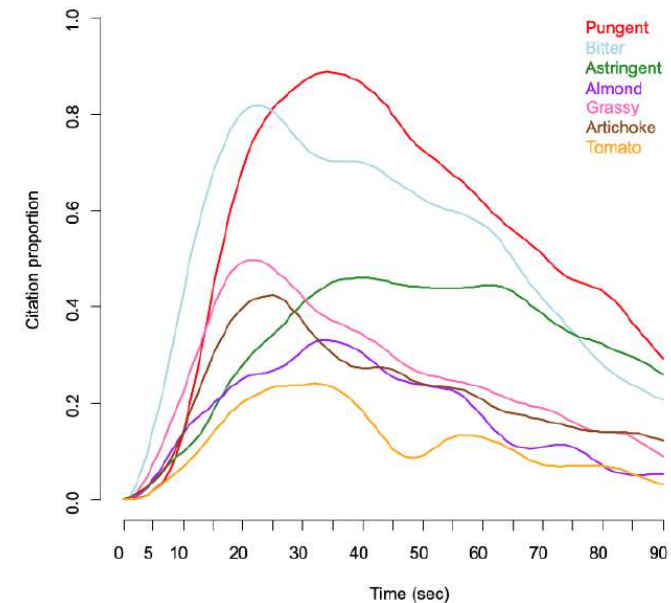
- During tasting, the judge is asked to check all the attributes that describe his/her perception at any one time and to check and uncheck attributes to reflect changes in what he/she perceives as he eats or drinks.

## Strengths

- Better dynamic sensory characterization

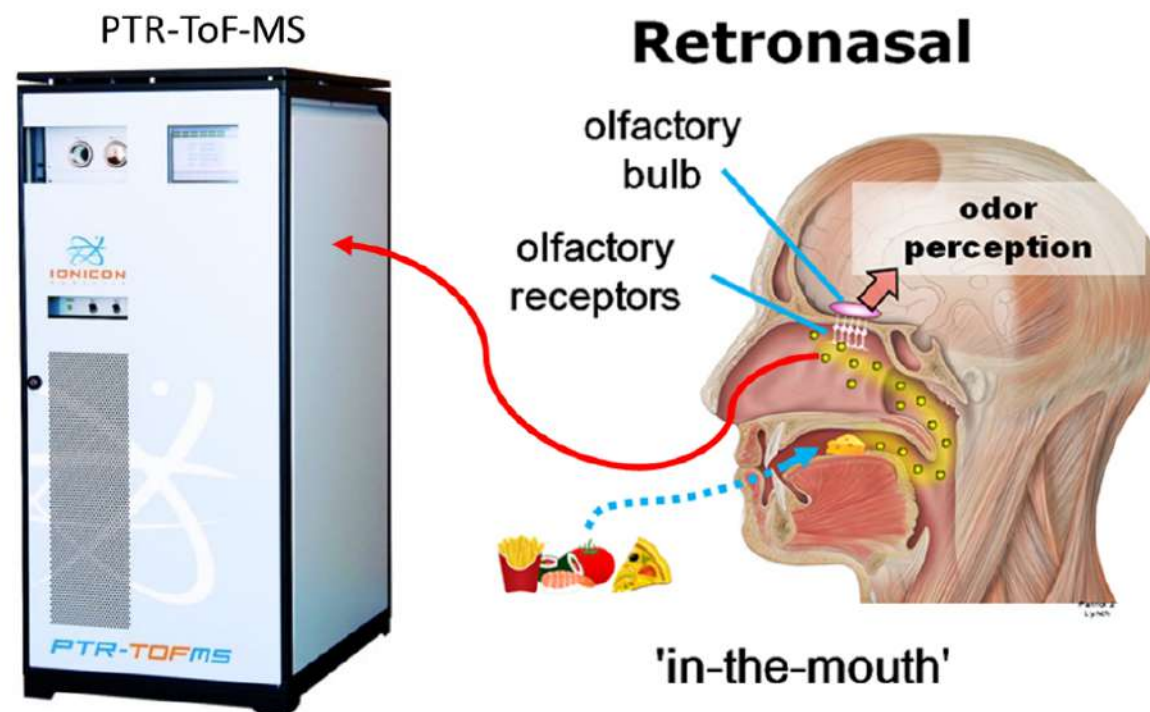
## Limitations

- *Complex task*



# Nosespace analysis

- Minimally invasive sampling;
- No excessive stress on volunteers;
- Allows quasi-normal behaviour during respiration or food consumption.

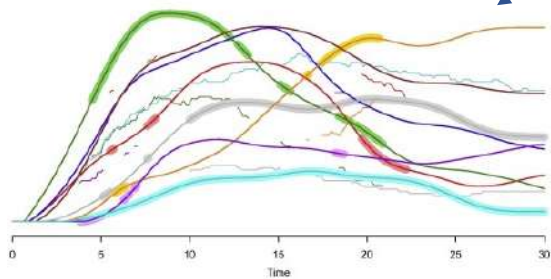


The nose and the mouth are connected

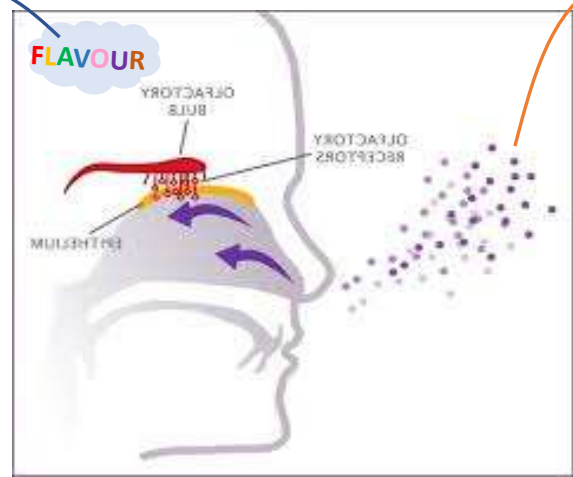
# DYNAMIC METHODS PAIRING

sensory evaluation

nosespace analysis



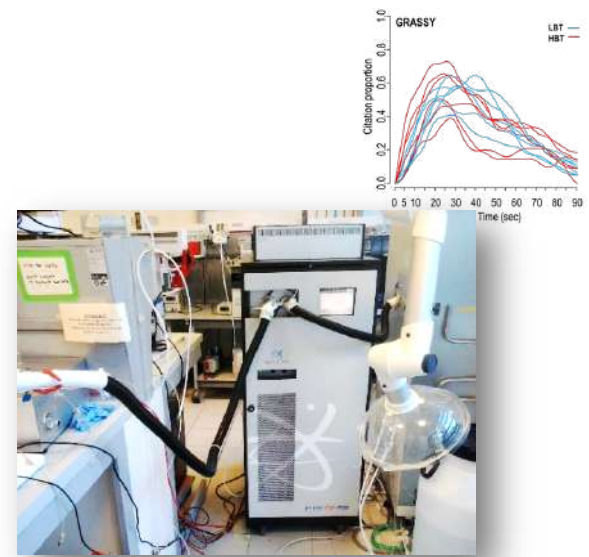
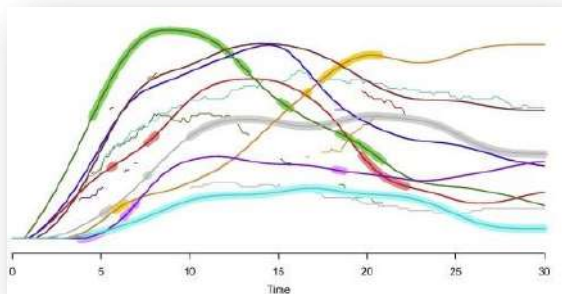
Temporal Check-All-That-Apply



PTR-ToF-MS



# NOSE-SPACE ANALYSIS & TCATA



**Temporal Check All That Apply**



**Nose-Space**

# EXPERIMENTAL DESIGN

## Samples:

Two Italian EVOO\* (2017/2018) with similar sensory profile: **O1** and **O2**



pure olive oil (2.5 ml)



olive oil on bread  
(1.5 mL of olive oil spread  
on 1.0 g of bread)



olive oil on chickpea  
(1.5 mL of olive oil spread on  
a chickpea)



Ten participants, 5 males and 5 females, mean age 41.5 years (SD = 11.7)

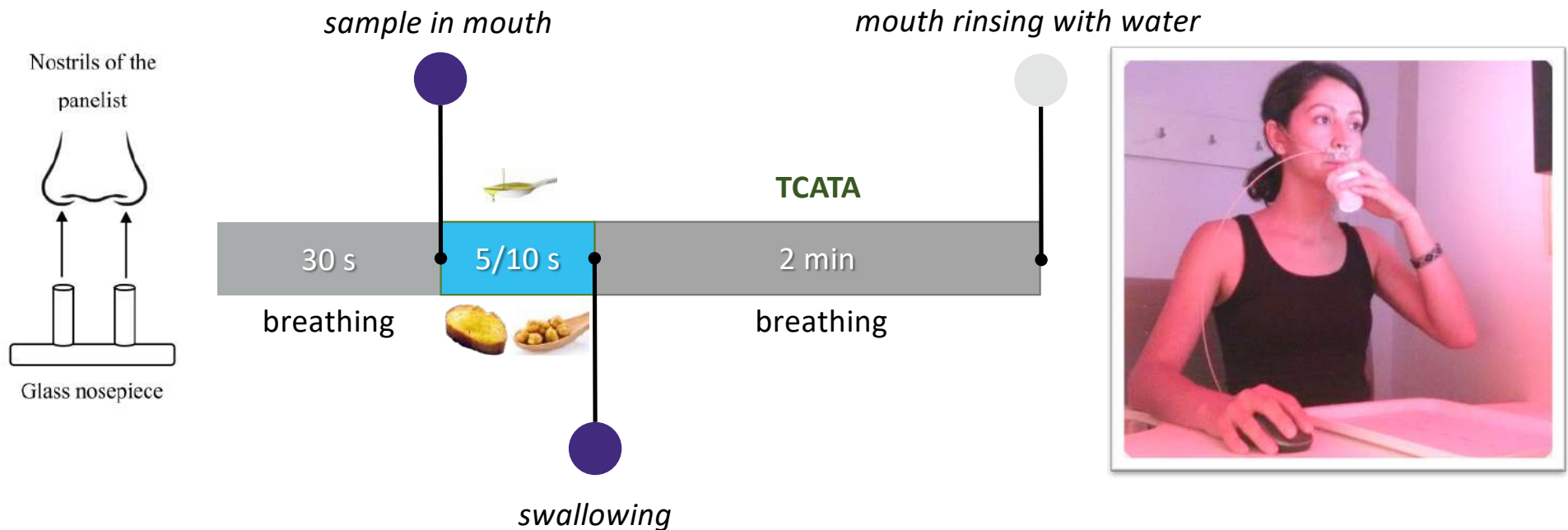


All samples served in **triplicates** (separate sessions)

\*O1 – cultivar: Olivastra saggianese mono cultivar, origin: Tuscany, Italy  
O2 – cultivar: Grignano mono cultivar, origin: Veneto, Italy

# DYNAMIC PROFILING of EVOOs

## Tasting protocol



# DYNAMIC PROFILING of EVOOs

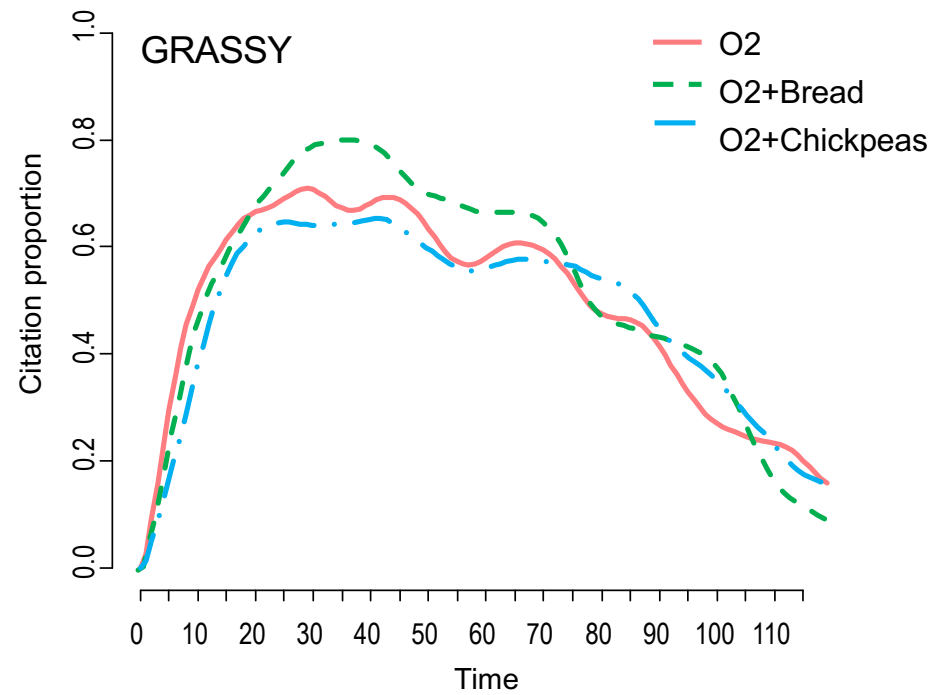
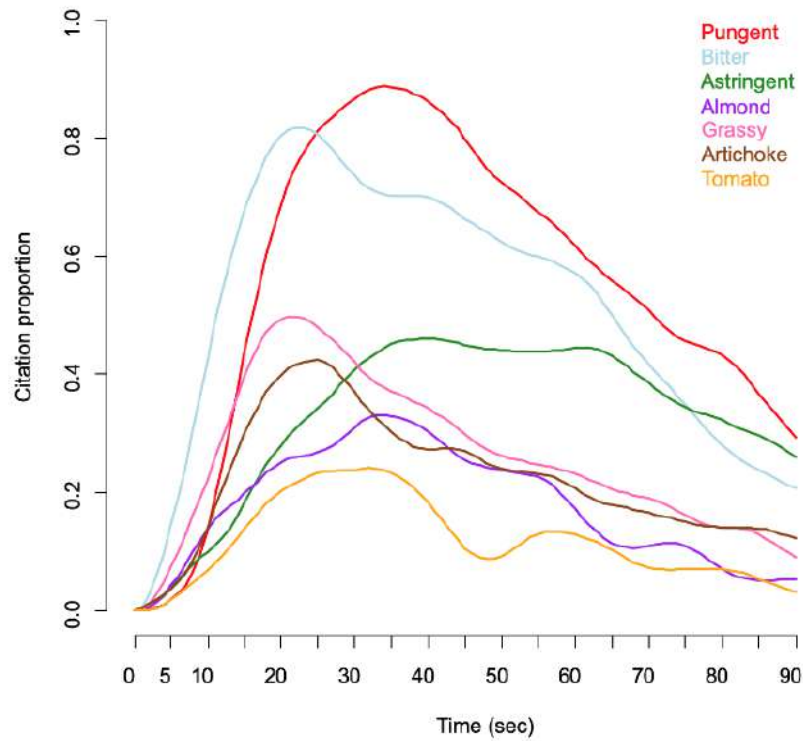


## TCATA: List of attributes

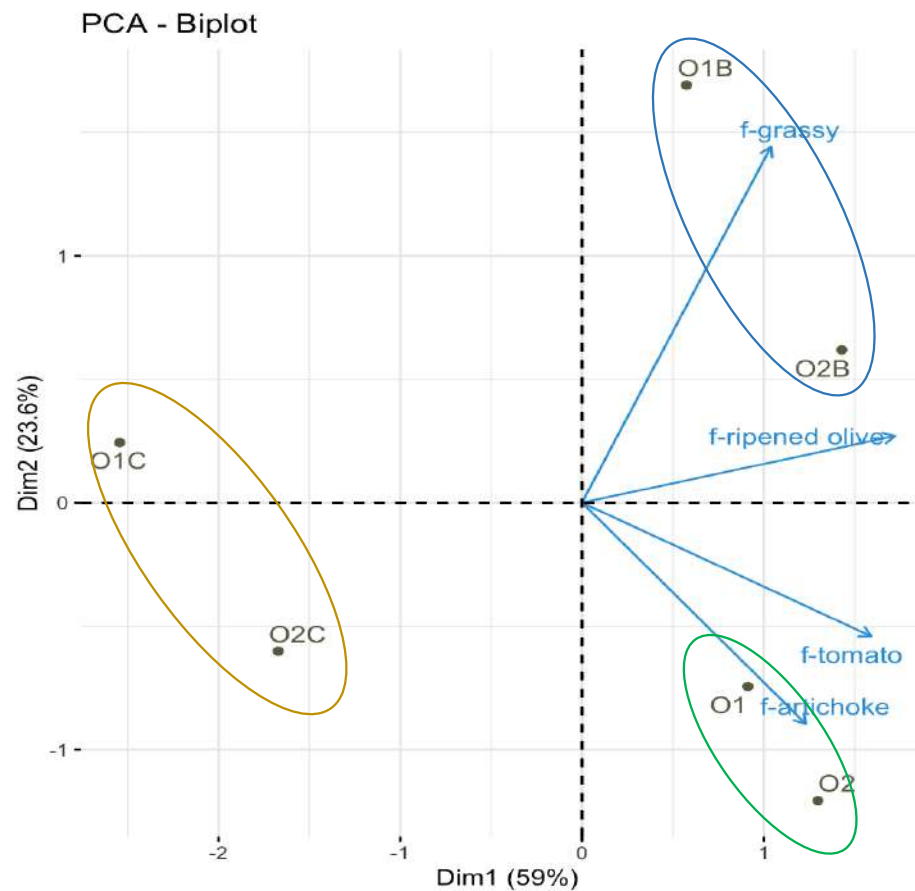
EVOO	Bread	Chickpea	EVOO with bread	EVOO with chickpea
Bitter	Bread	Chickpea	Bitter	Bitter
Astringent	Sweet	Salty	Astringent	Astringent
Pungent			Pungent	Pungent
Grass			Grass	Grass
Artichoke			Artichoke	Artichoke
Tomato			Tomato	Tomato
Ripened olive			Ripened olive	Ripened olive
			Bread	Chickpea
			Sweet	Salty



# SOME RESULTS



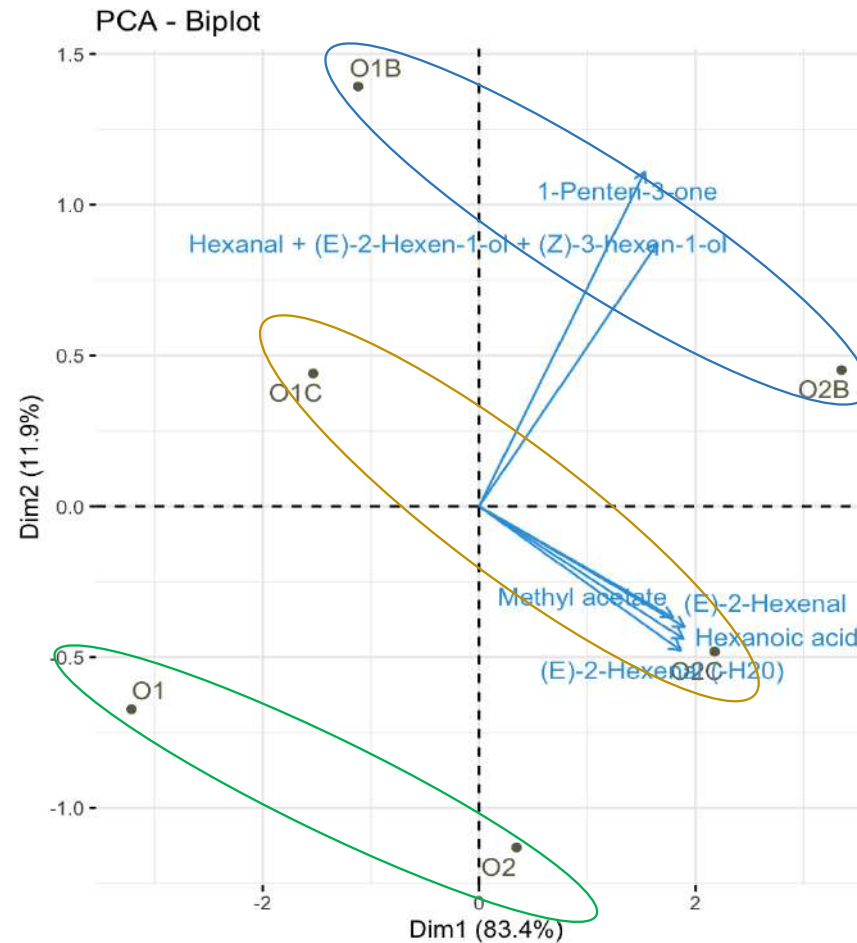
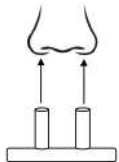
# SOME RESULTS: effect of the carrier



O1: EVOO 1  
 O2: EVOO 2  
 B: bread  
 C: chickpea

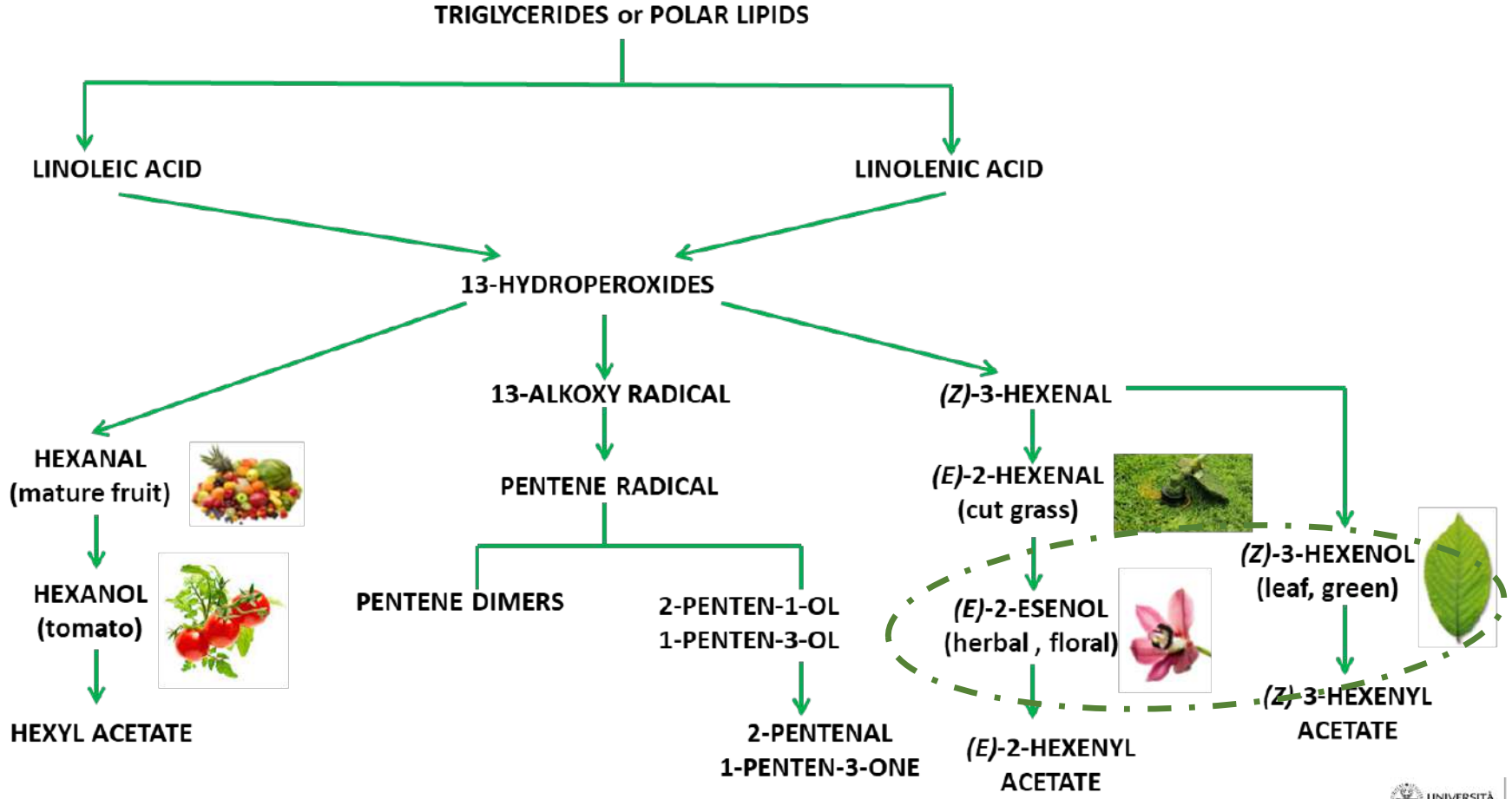
area under the curve (AUC)

# SOME RESULTS: effect of the carrier



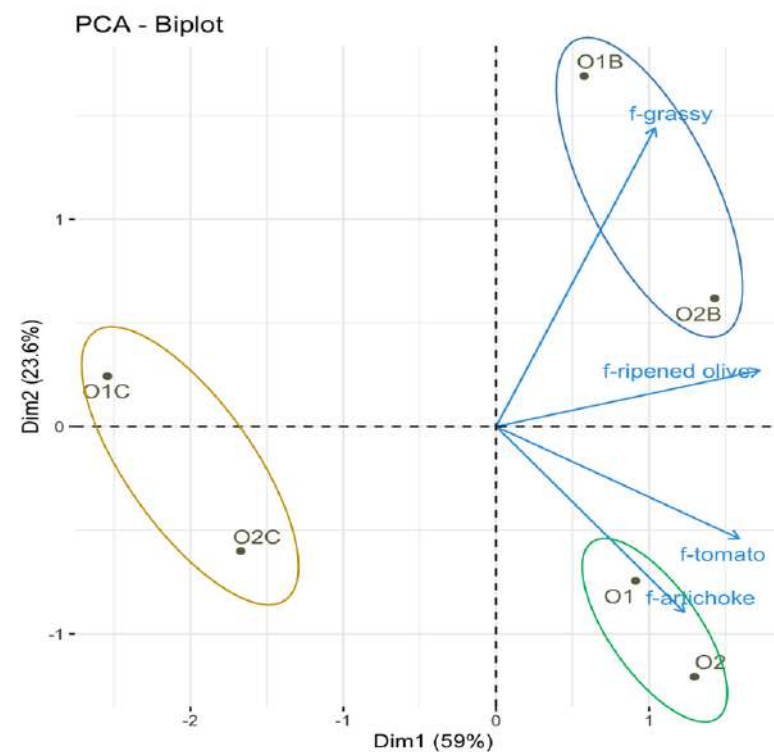
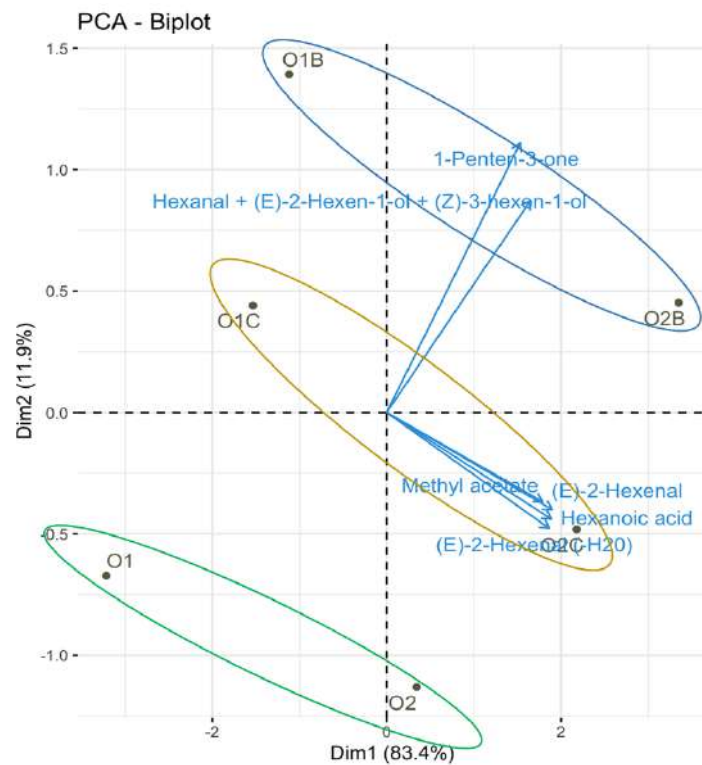
area under the curve (AUC)

# The origin of virgin olive oil fruity flavour: the Lipoxygenase (LOX) Pathway

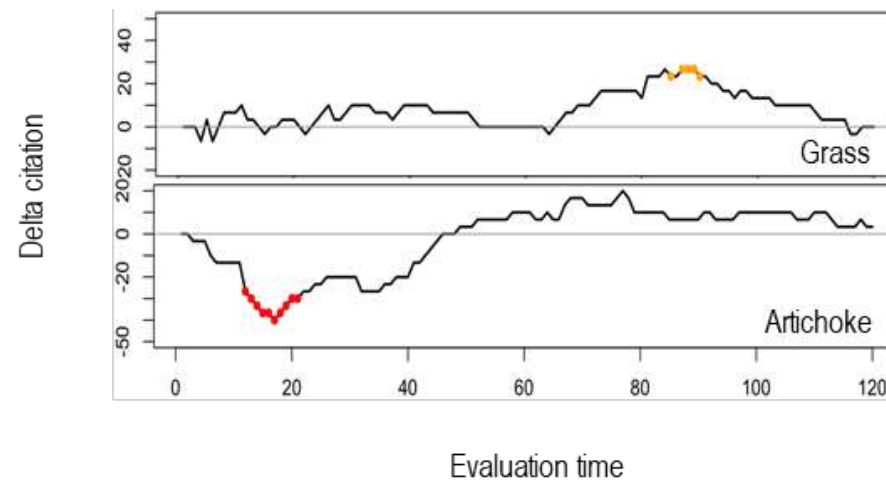
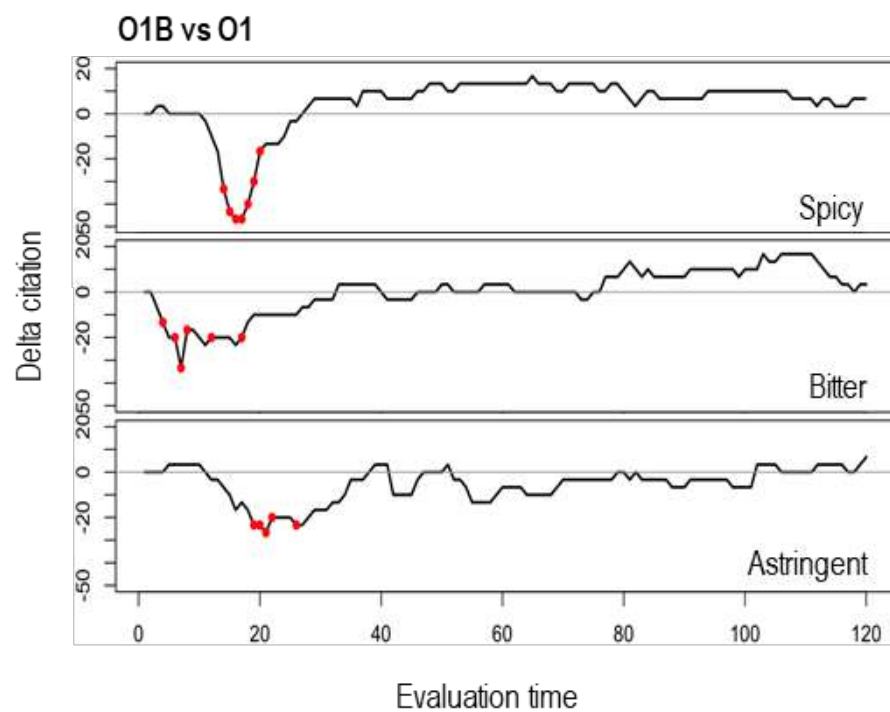




# SOME RESULTS: effect of the carrier



# SOME RESULTS: effect of the carrier



- $p < 0.05$
- $p < 0.10$

## CONCLUSIONS

- **Combining human responses and instrumental measurements allows us to better describe and understand the complex dynamic phenomenon of sensory perception of food**
  - **A carrier modify the sensory perception, suppressing or increasing specific attributes, of the EVOOs**
    - **Different carriers modify specific sensory descriptors**



Thank you for your  
kind attention!

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ADP PAT



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